

REMARKS

A. Formal Matters

The Examiner has objected to the specification on the ground that it lacks an update of the status of the parent case. Applicant does not understand this objection, because the present application has no parent. The Examiner's objection appears to be in error.

Applicant has amended Claims 1, 25, and 26 to implement most of the changes suggested by the Examiner. The only exception relates to the phrase "an oxygen supply". This phrase, which uses the indefinite article, is a positive recitation of the oxygen supply, and thus there is no lack of antecedent basis.

The amendments made in the claims are made only for purposes of clarity, and are not intended to limit the claims in any way.

B. Substantially Pure Oxygen

The Examiner has held that the term "substantially pure oxygen" is indefinite. Applicant submits that the term is definite for the reasons discussed below.

- 1) The term "substantially pure oxygen" appears
in claims of prior patents without further definition

As of this writing, a search of the database of U.S. patents issued since 1976 reveals that 300 patents contain the term "substantially pure oxygen" in their claims. (The Examiner can verify the above statement by

performing an independent search.) This fact alone indicates that the meaning of the term "substantially pure oxygen" is clear to those skilled in the art.

The present Applicant is a named inventor in two previous patents which contain the term "substantially pure oxygen" in the claims. These are U.S. Patent Nos. 5,611,833 and 4,931,013. The Examiner should note that not only do the claims recite "substantially pure oxygen", but that the specifications of these patents do not provide any further definition of this term. That is, both specifications give no indication of the degree of purity of the oxygen. This fact further shows that the term "substantially pure oxygen" is readily understood by anyone skilled in the art.

Applicant notes further that the reference now relied upon by the Examiner itself uses the term "substantially pure oxygen", without providing any further definition.

- 2) A person skilled in the art would understand the meaning of "substantially pure oxygen", based on the disclosure of the present specification

In addition to the facts set forth above, Applicant notes that the specification does contain sufficient information from which a reader skilled in the art could ascertain what is meant by "substantially pure oxygen". On page 10, first full paragraph, the specification describes the source of oxygen, and explains that the oxygen can be stored in liquid form, to be vaporized later, or it can be stored as a compressed gas. Alternatively, it can be generated at the site of use by non-cryogenic means such as an air-separation membrane system or a pressure swing adsorption (PSA) unit.

It is well known in the art that the oxygen obtained by vaporizing stored liquid oxygen will be at least about 99% pure. The same is likely to be true for compressed gas that has been generated by a conventional air-separation (distillation) process. In the case of non-cryogenic means, such as a membrane system or PSA unit, it is understood, by those skilled in the art, that the purity of oxygen is likely to be in the range of about 80-95%.

The present specification allows for all of the above possibilities. The oxygen stream may be of the order of 80% pure, or it may be nearly 100% pure, depending on which of the above-listed means of producing oxygen is used. These facts would be abundantly clear to anyone of ordinary skill in the art.

In summary, Applicant submits that the term "substantially pure oxygen" is clear on its face, and that the meaning of the term is further supported by the specification, which lists the ways in which the oxygen may be provided. Applicant submits further that the repeated use of the same term, in claims of other patents, shows that the Patent & Trademark Office has accepted the fact that this term is clear to persons skilled in the art.

C. Sole Reactive Gas

The Examiner has also objected to the recitation that the oxygen stream is the "sole reactive gas" introduced into the vessel from an external source.

Applicant submits that the meaning of the above term is clear. A "reactive" gas is one which reacts chemically with another substance. Oxygen is a prime example of a reactive gas. The inert or noble gases

(such as argon, xenon, etc.) are clearly not reactive gases. Also, nitrogen at room temperature is considered inert for practical purposes, as it does not react with other substances except at extremely high temperatures. The person of ordinary skill in the art would understand that "reactive gas" means a gas which reacts with other substances. Thus, the term used in the claim is definite.

Thus, the answer to the Examiner's question (on page 4, lines 3-4 of the Official Action) is that the limitation indeed means that no air is added, since air contains oxygen, which is reactive. The term means also that no other reactive gas, besides the pure oxygen, is brought from the outside to the inside of the vessel.

D. The Rejection Over the Prior Art

All of the pending claims have been rejected over EP 0341878 (Forsyth). Applicant submits that Forsyth neither anticipates nor suggests the present invention, for the following reasons.

Forsyth shows a fermenter in which the contents of a fermentation vessel are withdrawn from the vicinity of the bottom of the vessel, at opening 15, mixed with oxygen, and pumped back into the vessel. The mixture travels through pipe 11, and returns to the vessel through nozzles 17.

In Forsyth, movement of the mixture of the fermentation medium and oxygen is caused by pump 12 and venturi 14. The oxygen from pipe 13 is sucked into the venturi, and the entire mixture is moved, from the bottom to the top of the vessel, by pump 12.

The above arrangement is very different from that of the present

invention. In the present invention, there is no pump, and there is no venturi. Oxygen is not mixed with a sample of the contents of the vessel, but instead it is injected directly into the vessel. By avoiding the use of a pump, the present invention reduces the expenditure of energy by the process. Both examples given in Forsyth show that the pump consumes considerable power, of the order of 1200-1800 watts.

Claim 1 recites that the stream of substantially pure oxygen is moved through the vessel solely due to pressure in the oxygen supply. This language means that there is no pump. In Forsyth, the oxygen is moved through the vessel due to action of a pump, not due to pressure in the supply of oxygen. Therefore, Forsyth clearly does not anticipate or suggest what is recited in Claim 1. Claim 1 is therefore believed allowable.

Claim 25 recites that the injecting step is performed without any blower or compressor. Forsyth has the equivalent of a compressor, namely pump 12. Therefore, Forsyth does not anticipate or suggest what is recited in Claim 25. Claim 25 is therefore believed allowable.

Claim 26 recites that the injecting step is performed without mixing the oxygen with a liquid. In Forsyth, the oxygen is not injected directly, but is first mixed with a liquid that has been drawn out of the vessel by the pump. Forsyth clearly does not teach or suggest what is recited in Claim 26.

Contrary to the Examiner's statement that Forsyth does not show a "blower or compressor", or that Forsyth does not mix the oxygen with a liquid, the Forsyth reference clearly teaches that a pump is needed for circulating the liquid and oxygen, and that the liquid and oxygen are mixed outside the vessel, before being returned to the vessel. These teachings stand in clear contrast with what is claimed in the present application.

For the reasons given above, Applicant submits that the claims, as amended, define a patentable invention. Applicant therefore requests reconsideration by the Examiner and early favorable action.